

The listing of claims will replace all prior versions, and listings, of claims in the application:

Please AMEND the claims as follows:

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3/14/05
1. (Cancelled)
 2. (Cancelled)
 3. (Previously ~~Amended~~ ^{Presented}) The method of claim 8 wherein said access network is a wireless network.
 4. (Previously ~~Amended~~ ^{Presented}) The method of claim 8 wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS).
 5. (Original) The method of claim 4 wherein said first and second access controllers are Media Access Control (MAC) devices residing on different physical line cards within the CMTS, said first and second access controllers being configured or designed to operate in accordance with a DOCSIS standard.
 6. (Previously ~~Amended~~ ^{Presented}) The method of claim 8 further including generating at least one synchronization signal from a synchronization device, said synchronization signal including time reference data to be used to synchronize each of the plurality of access controllers in the access control system.
 7. (Previously ~~Amended~~ ^{Presented}) The method of claim 8 wherein the synchronization signal is provided at periodic intervals to the first and second access controllers.
 8. (Currently Amended) A method for synchronizing time reference devices in an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each media access controller controlling a respective interface to the access network, the plurality of media access controllers including a first distinct access controller for controlling a first interface, said first access controller including a first time reference device, said first interface including a first distinct plurality of ports for communicating with at least a first portion of the plurality of nodes, the plurality of access controllers further including a second distinct access controller for controlling a second interface, said second access controller including a second time reference device, said second interface including a second distinct plurality of ports for communicating with at least a second portion of the plurality of nodes, the method comprising:

providing at least one synchronization signal to said first and second access controllers;
and

utilizing, at said first and second access controllers, said at least one synchronization signal in a manner which results in the first and second time reference devices being in synchronization with each other;

wherein said first access controller and said first interface reside on a first physical line card within the access control system, and wherein the second access controller and second interface reside on a second physical line card within the access control system;

wherein said first plurality of ports includes a first downstream channel transmitter and at least one first upstream channel receiver, and wherein the second plurality of ports includes a second downstream channel transmitter and at least one second upstream channel receiver; ~~said method further comprising:~~

providing a first time reference message to a first node on said first downstream channel, said first time reference being generated by said first time reference device; and

receiving data from said first node at said Head End via said second upstream channel.

9. (Original) The method of claim 8 further comprising using said first time reference message to synchronize a time reference device within said first node with said first time reference device.

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10. (Previously ~~Amended~~) The method of claim 8 further including:

providing time reference data to each of the plurality of access controllers; and

simultaneously loading, at each of the plurality of access controllers, said time reference data into its respective time reference device to thereby cause each of the time reference devices to be synchronized with each other.

11. (Original) The method of claim 10 further comprising:

asserting a DATA_VALID signal to each access controller to thereby cause each access controller to load said time reference data within an internal memory device; and

de-asserting said DATA_VALID signal to thereby cause each access controller to stop loading data into the internal memory device.

12. (Original) The method of claim 11 wherein said loading includes simultaneously providing a LOAD_DATA signal to each access controller to thereby cause each access controller to simultaneously load the time reference data from its internal memory device into its time reference device.

13. (Original) The method of claim 11 wherein said loading includes each access controller automatically loading the time reference data from its internal memory device into its time reference device at a predefined time after said DATA_VALID signal has been de-asserted.

14. (Previously ^{Presented} Amended) The method of claim 8 further comprising providing time reference synchronization messages from the Head End to the plurality of network nodes.

15. (Original) The method of claim 14 wherein a first plurality of network nodes belong to a first DOCSIS domain, and a second plurality of network nodes belong to a second DOCSIS domain.

16. (Cancelled)

17. (Cancelled)

18. (Cancelled)

19. (Previously ^{Presented} Amended) A method of configuring an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each of the plurality of media access controllers controlling a respective interface to the access network, each of the plurality of media access controllers including a distinct time reference device, each interface including a distinct plurality of ports for communicating with at least a portion of the plurality of nodes, the method comprising:

synchronizing the time reference devices in each of the plurality of access controllers; and
assigning selected ports from the plurality of interfaces to particular domains within the access network;

wherein said assigning includes assigning at least one port from a first interface to a first domain, and assigning at least one port from a second interface to said first domain;

wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS);

wherein said first and second domains are different DOCSIS domains.

Presented
20. (Previously ~~Amended~~) The method of claim 19 wherein said first interface resides on a first physical line card within the access control system, and the second interface resides on a second physical line card within the access control system.

Presented
21. (Previously ~~Amended~~) The method of claim 19 wherein said first domain includes at least two downstream channels.

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22. (Previously ~~Amended~~) The method of claim 19 wherein said first domain includes a first plurality of ports, said first plurality of ports including at least two downstream channel transmitters.

23. (Cancelled)

Presented
24. (Previously ~~Amended~~) The method of claim 28 wherein said first access controller and said first interface reside on a first physical line card within the access control system, and the second access controller and second interface reside on a second physical line card within the access control system.

25. (Cancelled)

26. (Cancelled)

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27. (Previously ~~Amended~~) The method of claim 28 wherein said first node is a cable modem belonging to a first DOCSIS domain, and said second node is a cable modem belonging to a second DOCSIS domain.

Presented
28. (Previously ~~Amended~~) A method for synchronizing nodes in an access network to a common time reference, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each of the plurality of media access controllers controlling a respective interface to the access network, each of the plurality of media access controllers including a distinct time reference device, each interface including a distinct plurality of ports for communicating with at least a portion of the plurality of nodes, the method comprising:

providing a first time reference message to a first node via a first downstream channel, the first downstream channel being associated with a first media access controller and a first interface, the first time reference message being generated from a first time reference device associated with the first media access controller;

providing a second time reference message to a second node via a second downstream channel, the second downstream channel being associated with a second media access controller

and a second interface, the second time reference message being generated from a second time reference device associated with the second media access controller, wherein said first and second time reference devices are synchronized with each other; and

synchronizing said first and second nodes by using said first time reference message to synchronize a time reference device of said first node with said first time reference device, and using said second time reference message to synchronize a second time reference device of said second node with said second time reference device;

wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS);

wherein said first and second access controllers are Media Access Control (MAC) devices residing on different physical line cards within the CMTS, said first and second access controllers being configured or designed to operate in accordance with a DOCSIS standard;

wherein said first and second nodes are cable modems belonging to a first DOCSIS domain.

29. (Cancelled)

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59. (Currently Amended) A computer program product for synchronizing interfaces of an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of slave media access controllers, each slave media access controller controlling a respective interface to the access network, the plurality of slave media access controllers including a first distinct access controller for controlling a first interface, said first access controller including a first time reference device, said first interface including a first distinct plurality of ports for communicating with at least a first portion of the plurality of nodes, the plurality of access controllers further including a second distinct access controller for controlling a second interface, said second access controller including a second time reference device, said second interface including a second distinct plurality of ports for communicating with at least a second portion of the plurality of nodes, the computer program product comprising:

a computer usable medium having computer readable code embodied therein, the computer readable code comprising:

computer code for providing at least one synchronization signal to said first and second access controllers; and

computer code for utilizing, at said first and second access controllers, said at least one synchronization signal in a manner which results in the first and second time reference devices being in synchronization with each other;

wherein said first access controller and said first interface reside on a first physical line card within the access control system, and wherein the second access controller and second interface reside on a second physical line card within the access control system;

wherein said first plurality of ports includes a first downstream channel transmitter and at least one first upstream channel receiver, and wherein the second plurality of ports includes a second downstream channel transmitter and at least one second upstream channel receiver[.]; ~~said method further comprising:~~

computer code for providing a first time reference message to a first node on said first downstream channel, said first time reference being generated by said first time reference device; and

computer code for receiving data from said first node at said Head End via said second upstream channel.

60. (Original) The computer program product of claim 59 wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS).

61. (Original) The computer program product of claim 59 further including:

computer code for providing time reference data to each of the plurality of access controllers; and

computer code for loading, at each of the plurality of access controllers, said time reference data into its respective time reference device to thereby cause each of the time reference devices to be synchronized with each other.

62. ^{Presented} (Previously ~~Amended~~) A computer program product of configuring an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of slave media access controllers, each of the plurality of slave media access controllers controlling a respective interface to the access network, each of the plurality of slave media access controllers including a distinct time reference device, each interface including a plurality of distinct ports for communicating with at least a portion of the plurality of nodes, the computer program product comprising a computer usable medium having computer readable code embodied therein, the computer readable code comprising:

computer code for synchronizing the time reference devices in each of the plurality of access controllers; and

computer code for assigning selected ports from the plurality of interfaces to particular domains within the access network;

wherein said assigning code includes computer code for assigning at least one port from a first interface to a first domain, and computer code for assigning at least one port from a second interface to said first domain;

wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS);

wherein said first and second domains are different DOCSIS domains.

63. (Cancelled)

64. (Cancelled)

65. ^{Presented} (Previously ~~Amended~~) A computer program product for synchronizing nodes in an access network to a common time reference, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of slave media access controllers, each of the plurality of slave media access controllers controlling a respective interface to the access network, each of the plurality of slave media access controllers including a distinct time reference device, each interface including a plurality of distinct ports for communicating with at least a portion of the plurality of nodes, the computer program product comprising:

a computer usable medium having computer readable code embodied therein, the computer readable code comprising:

computer code for providing a first time reference message to a first node via a first downstream channel, the first downstream channel being associated with a first slave media access controller and a first interface, the first time reference message being generated from a first time reference device associated with the first slave media access controller;

computer code for providing a second time reference message to a second node via a second downstream channel, the second downstream channel being associated with a second slave media access controller and a second interface, the second time reference message being generated from a second time reference device associated with the second slave media access controller, wherein said first and second time reference devices are synchronized with each other; and

computer code for synchronizing said first and second nodes by using said first time reference message to synchronize a time reference device of said first node with said first time reference device, and using said second time reference message to synchronize a second time reference device of said second node with said second time reference device;

wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS);

wherein said first and second access controllers are Media Access Control (MAC) devices residing on different physical line cards within the CMTS, said first and second access controllers being configured or designed to operate in accordance with a DOCSIS standard;

wherein said first and second nodes are cable modems belonging to a first DOCSIS domain.

66. (Cancelled)

67. (Currently Amended) An apparatus for synchronizing time reference devices in an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each media access controller controlling a respective interface to the access network, the plurality of media access controllers including a first distinct access controller for controlling a first interface, said first access controller including a first time reference device, said first interface

including a first distinct plurality of ports for communicating with at least a first portion of the plurality of nodes, the plurality of access controllers further including a second distinct access controller for controlling a second interface, said second access controller including a second time reference device, said second interface including a second distinct plurality of ports for communicating with at least a second portion of the plurality of nodes, comprising:

means for providing at least one synchronization signal to said first and second access controllers; and

means for utilizing, at said first and second access controllers, said at least one synchronization signal in a manner which results in the first and second time reference devices being in synchronization with each other;

wherein said first access controller and said first interface reside on a first physical line card within the access control system, and wherein the second access controller and second interface reside on a second physical line card within the access control system;

wherein said first plurality of ports includes a first downstream channel transmitter and at least one first upstream channel receiver, and wherein the second plurality of ports includes a second downstream channel transmitter and at least one second upstream channel receiver; ~~said apparatus further comprising:~~

means for providing a first time reference message to a first node on said first downstream channel, said first time reference being generated by said first time reference device; and

means for receiving data from said first node at said Head End via said second upstream channel.

68. (Currently Amended) An apparatus for synchronizing time reference devices in an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each media access controller controlling a respective interface to the access network, the plurality of media access controllers including a first distinct access controller for controlling a first interface, said first access controller including a first time reference device, said first interface including a first distinct plurality of ports for communicating with at least a first portion of the plurality of nodes, the plurality of access controllers further including a second distinct access controller for controlling a second interface, said second access controller including a second

time reference device, said second interface including a second distinct plurality of ports for communicating with at least a second portion of the plurality of nodes, comprising:

- a processor; and

- a memory, at least one of the processor and the memory being adapted for:

 - providing at least one synchronization signal to said first and second access controllers; and

 - utilizing, at said first and second access controllers, said at least one synchronization signal in a manner which results in the first and second time reference devices being in synchronization with each other;

 - wherein said first access controller and said first interface reside on a first physical line card within the access control system, and wherein the second access controller and second interface reside on a second physical line card within the access control system;

 - wherein said first plurality of ports includes a first downstream channel transmitter and at least one first upstream channel receiver, and wherein the second plurality of ports includes a second downstream channel transmitter and at least one second upstream channel receiver; ~~wherein at least one of the processor and the memory are further adapted for:~~

 - providing a first time reference message to a first node on said first downstream channel, said first time reference being generated by said first time reference device; and

 - receiving data from said first node at said Head End via said second upstream channel.

Presented

69. (Previously ~~Added~~) An apparatus for configuring an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each of the plurality of media access controllers controlling a respective interface to the access network, each of the plurality of media access controllers including a distinct time reference device, each interface including a distinct plurality of ports for communicating with at least a portion of the plurality of nodes, comprising:

- a processor; and

- a memory, at least one of the processor and the memory being adapted for:

 - synchronizing the time reference devices in each of the plurality of access controllers; and

 - assigning selected ports from the plurality of interfaces to particular domains within the access network;

wherein said assigning includes assigning at least one port from a first interface to a first domain, and assigning at least one port from a second interface to said first domain;

wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS);

wherein said first and second domains are different DOCSIS domains.

70. ^{presented} (Previously ~~Added~~) An apparatus for configuring an access network, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each of the plurality of media access controllers controlling a respective interface to the access network, each of the plurality of media access controllers including a distinct time reference device, each interface including a distinct plurality of ports for communicating with at least a portion of the plurality of nodes, comprising:

means for synchronizing the time reference devices in each of the plurality of access controllers; and

means for assigning selected ports from the plurality of interfaces to particular domains within the access network;

wherein said assigning includes assigning at least one port from a first interface to a first domain, and assigning at least one port from a second interface to said first domain;

wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS);

wherein said first and second domains are different DOCSIS domains.

71. ^{presented} (Previously ~~Added~~) An apparatus for synchronizing nodes in an access network to a common time reference, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each of the plurality of media access controllers controlling a respective interface to the access network, each of the plurality of media access controllers including a distinct time reference device, each interface including a distinct plurality of ports for communicating with at least a portion of the plurality of nodes, comprising:

means for providing a first time reference message to a first node via a first downstream channel, the first downstream channel being associated with a first media access controller and a first interface, the first time reference message being generated from a first time reference device associated with the first media access controller;

means for providing a second time reference message to a second node via a second downstream channel, the second downstream channel being associated with a second media access controller and a second interface, the second time reference message being generated from a second time reference device associated with the second media access controller, wherein said first and second time reference devices are synchronized with each other; and

means for synchronizing said first and second nodes by using said first time reference message to synchronize a time reference device of said first node with said first time reference device, and using said second time reference message to synchronize a second time reference device of said second node with said second time reference device;

wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS);

wherein said first and second access controllers are Media Access Control (MAC) devices residing on different physical line cards within the CMTS, said first and second access controllers being configured or designed to operate in accordance with a DOCSIS standard;

wherein said first and second nodes are cable modems belonging to a first DOCSIS domain.

Presented
72. (Previously ~~Added~~) An apparatus for synchronizing nodes in an access network to a common time reference, the access network comprising a Head End and a plurality of nodes, the Head End including an access control system having a plurality of media access controllers, each of the plurality of media access controllers controlling a respective interface to the access network, each of the plurality of media access controllers including a distinct time reference device, each interface including a distinct plurality of ports for communicating with at least a portion of the plurality of nodes, comprising:

a processor; and

a memory, at least one of the processor and the memory being adapted for:

providing a first time reference message to a first node via a first downstream channel, the first downstream channel being associated with a first media access controller and a first interface, the first time reference message being generated from a first time reference device associated with the first media access controller;

providing a second time reference message to a second node via a second downstream channel, the second downstream channel being associated with a second media access controller

and a second interface, the second time reference message being generated from a second time reference device associated with the second media access controller, wherein said first and second time reference devices are synchronized with each other; and

synchronizing said first and second nodes by using said first time reference message to synchronize a time reference device of said first node with said first time reference device, and using said second time reference message to synchronize a second time reference device of said second node with said second time reference device;

wherein said access network is a cable network, said plurality of nodes are cable modems, and wherein said access control system is a Cable Modem Termination System (CMTS);

wherein said first and second access controllers are Media Access Control (MAC) devices residing on different physical line cards within the CMTS, said first and second access controllers being configured or designed to operate in accordance with a DOCSIS standard;

wherein said first and second nodes are cable modems belonging to a first DOCSIS domain.